-8-

## CLAIMS

1.      A structural sandwich plate member comprising:

        first and second outer plates;

        a core of plastics or polymer material bonded to said outer plates with sufficient strength to transfer shear forces therebetween; and

        a plurality of lightweight forms within the core, wherein said forms do not tesselate in a plane parallel to said outer metal layers and have principal dimensions in the range of from 20 to 200% of the distance between said outer metal layers.

2.      A structural sandwich plate member according to claim 1 wherein said lightweight forms are arranged in a single layer.

3.      A structural sandwich plate member according to claim 1 wherein said lightweight forms are arranged in multiple layers.

4.      A structural sandwich plate member according to claim 3 further comprising an interlayer between two of said multiple layers of forms.

5.      A structural sandwich plate member according to claim 3 or 4 wherein the forms of one layer directly overly the forms of the layer below so that there are parts of the core material extending directly between the outer plates.

6.      A structural sandwich plate member according to any one of the preceding claims wherein said lightweight forms are hollow.

7.      A structural sandwich plate member according to any one of the preceding claims wherein said forms are spherical.

8.      A structural sandwich plate member according to claim 7 wherein said forms have a diameter substantially equal to $1/N$ of the distance between said outer plates, $N$ being an integer in the range of from 1 to 5.

9.      A structural sandwich plate member according any one of the preceding claims wherein said forms have a diameter greater than or equal to 20mm.

10.     A structural sandwich plate member according any one of the preceding claims wherein said forms have a diameter less than or equal to 100mm.

11.     A structural sandwich plate member according to claim 6, 7, 8, 9 or 10 wherein said forms are made of polypropylene and have a solid skin.

12.     A structural sandwich plate member according to any one of claims 1 to 10 wherein said forms are made of metal, ceramic, or a high tensile strength fabric, such as Kevlar(TM) or Spectra(TM).

13.     A structural sandwich plate member according to any one of the preceding claims wherein said forms have a plurality of protrusions so as to increase the spacing between them, and hence the proportion of the core cavity occupied by core material.

14.     A structural sandwich plate member according to any one of the preceding claims wherein said forms are filled with an inert gas, a fire retardant substance, a thermal or acoustic insulating fluid or a partial vacuum.

15.     A structural sandwich plate member according to any one of the preceding claims further comprising a mesh, e.g of wire, to assist the placing of the forms and space them apart from each other and/or from the outer plates.

16.     A structural sandwich plate member according to any one of the preceding claims wherein said core has a thickness greater than or equal to 20mm.

17.     A structural sandwich plate member according to any one of the preceding claims wherein said outer plates are made of metal.

18.     A structural sandwich plate member according to any one of the preceding claims wherein said outer plates have a thickness greater than or equal to 0.5mm.

19.     A method of manufacturing a structural sandwich plate member comprising the steps of:

providing first and second outer plates in a spaced-apart relationship and a plurality of lightweight forms within the space between said plates, wherein said forms do not tesselate in a plane parallel to said outer metal layers and have principal dimensions in the range of from 20 to 200% of the distance between said plates;

5          injecting uncured plastics or polymer material to fill the space defined between said outer plates and around said plurality of forms; and

allowing said plastics or polymer material to cure to bond said outer plates together with sufficient strength to transfer shear forces therebetween.

10